HONOLULU
LA JOLLA
MONTEREY
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SOUTHWEST FISHERIES CENTER

MONTHLY REPORT - NOVEMBER 1983
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SOUTHWEST FISHERIES CENTER
LA JOLLA, CALIFORNIA

HONOLULU LABORATORY
LA JOLLA LABORATORY
TIBURON LABORATORY
PACIFIC ENVIRONMENTAL GROUP

MONTHLY REPORT - NOVEMBER 1983

STATUS OF PUBLICATIONS

Published

Ambrose, David A., John L. Butler, H. Geoffrey Moser, Barbara Y. Sumida, Elaine M. Sandknop, and Elizabeth G. Stevens. 1983. Description of the larvae of the cusk eels Ophidion scrippsae and Chilara taylori (Family Ophidiidae). CalCOFI Rep., 24:226-234.

Larvae of the species of cusk eels (Ophidiidae) found in the CalCOFI region, Ophidion scrippsae and Chilara taylori, are described from specimens reared in the laboratory and from specimens collected in the field. Larvae are distinguished by morphological, meristic, and pigment-pattern differences. C. taylori larvae are proportionately longer and more slender, have more vertebrae, and have more dorsal and anal fin rays than do O. scrippsae. The gut loop forms at a longer body length in C. taylori (ca. 14.1 mm) than in O. scrippsae (ca. 7.5 mm). O. scrippsae larvae have no pigment in the caudal fin, and the anal fin usually has numerous melanophores, whereas C. taylori larvae have caudal fin pigment and little, if any, pigment in the dorsal and anal fins. Analysis of ophidiid larvae collected in CalCOFI survey cruises from 1972 to 1978 revealed a relatively low abundance and a distribution centered around points and capes from San Diego to the vicinity of Magdalena Bay, reflecting the nearshore nature of these fish.

Bagarinao, Teodora and John R. Hunter. 1983. The visual feeding threshold and action spectrum of northern anchovy (Engraulis mordax) larvae. CalCOFI Rep., 24:245-254.

The visual feeding threshold and action spectrum of 10-15 mm northern anchovy larvae were determined, using as criterion the

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incidence of two or more rotifers in the guts of 50% of larvae tested under different spectral irradiances. The threshold sensitivity to broadband blue-green light is at 0.15 μWcm^{-2}=0.61 lux. The action spectrum shows a maximum in the green wavelengths around 530 nm: the weighted threshold irradiances at various wavelength bands converge at a mean value of 0.14 μWcm^{-2}anch. eff.

The visual abilities of the anchovy allow them to feed at a depth of 74 m at noon on clear days, and at the surface during twilight and bright nights, and appear to be well adapted to the anchovy's habitat in turbid, greenish coastal waters. Comparisons with younger anchovy larvae show that changes in visual function accompany changes in eye and retinal morphology, specifically the recruitment of rods. Moreover, 10-15 mm anchovy larvae can feed to a limited extent (10%) in the dark when food densities are high (20-40 rotifers/ml). In March, which is the peak spawning season of the anchovy in southern California and Baja California, the 10-15 mm larvae have 13 hours each day to feed.

Fiedler, Paul C. 1983. Satellite remote sensing of the habitat of spawning anchovy in the Southern California Bight. CalCOFI Rep., 24: 202-209.

Images of sea-surface temperature and phytoplankton pigments in the Southern California Bight were processed from satellite data obtained during four intensive CalCOFI anchovy egg surveys from 1980 to 1982. Mesoscale patterns of water masses and fronts in the images can explain the distribution of northern anchovy spawning as indicated by first-day eggs. In general, spawning in the northwestern region of the Bight is excluded from a cold-water mass south of Point Conception, whereas spawning to the south is confined to coastal waters with moderately high phytoplankton pigment levels. The satellite-measured parameters may indicate critical factors for larval survival. Such satellite images can be used to improve the sampling efficiency of egg surveys.

Harrison, Craig S., Thomas S. Hida, and Michael P. Seki. 1983. Hawaiian seabird feeding ecology. Wildl. Monogr. 85:1-71.

Fishery development proposals for the Northwestern Hawaiian Islands, where about 10 million seabirds nest, led to a need for food habit studies of seabirds to aid in their management. The food items were diverse; members of 56 families of fish, 8 families of squid, and 11 groups of crustaceans were identified. The birds fed largely on flyingfishes and squids. Decapterus spp., juvenile goatfishes, juvenile lizardfishes, and mesopelagic fishes were commonly consumed. The food items ranged from tiny copepods measuring but a few millimeters to flyingfishes measuring more than 25 cm. All of the seabirds were opportunistic and fed on a wide variety of shoaling fish and squid. Variation in diet for most species was more correlated with season than with location. Some resource partitioning among species was evident in

the composition and in the size of prey. Differences in diet may reflect differences among species in morphology, feeding techniques, time of feeding, seasonality of breeding, and feeding location.

Hewitt, Roger P. and Gary D. Brewer. 1983. Nearshore production of young anchovy. CalCOFI Rep., 24:235-244.

The daily production of northern anchovy eggs and larvae is determined for the nearshore region (within ca. 3 mi of the coast) of the Southern California Bight. Stage-specific catches were obtained from monthly Ichthyoplankton Coastal and Harbor Studies (ICHS) cruises during 1979-80. Age-specific production estimates are derived by pooling and adjusting the catches for growth and sampler bias. Hazard functions are introduced, and a production curve is fit to the data. Production of young anchovy was compared with that for the greater Southern California Bight; there was no evidence for greater production inshore. The spawning cycle and survival of young in the nearshore region reflected that occurring throughout the Southern California Bight.

Laurs, R. Michael. 1983. The North Pacific albacore--an important visitor to California Current waters. CalCOFI Rep., 24:99-106.

The North Pacific albacore, Thunnus alalunga, is a highly migratory species, valuable to domestic and foreign fisheries. Albacore are found off the west coast of North America from about central Baja California to British Columbia, Canada, from late spring through fall. U.S. fishermen traditionally harvested the resource with surface gear within a few hundred miles of the shore until the mid-1970's, when an increasing number of West Coast- and Hawaiian-based jig vessels began operating from slightly west of the date line eastward across the North Pacific. A U.S. longline subsurface fishery also appears to be developing during winter beyond 1200 miles off southern California. The albacore is also highly sought after along the U.S. west coast by a large number of sportfishermen.

At the present time none of the North Pacific albacore fisheries is under management. Statistics and analysis currently available indicate that the resource is healthy. Recent estimates of MSY range from about 92,000 MT to 166,000 MT. Since the early 1960's, total catches for all fisheries harvesting albacore in the North Pacific have fluctuated; during the past decade they have ranged from about 70,000 MT to 124,000 MT.

Results from recent tagging studies suggest (1) that there are at least two substocks of fish constituting the North Pacific albacore population and (2) that these substocks have different migratory patterns. Off North America the separation in the proposed substocks occurs at Cape Mendocino, California, near 40°N. The proposed northern substock of fish makes trans-Pacific

migrations between the eastern and western North Pacific, resulting in an exchange of fish between the northern area of the U.S. fishery and the Japanese livebait and gillnet fisheries, and the longline fishery west of 180°. The proposed southern group of fish appear to enter the U.S. fishery south of about 40°N and are also fished by the longline fisheries east of 180°.

The migration, distribution, availability, and vulnerability of albacore are markedly influenced by oceanographic conditions in the North Pacific, notably by oceanic fronts. Recent research using acoustic telemetry methods to determine the location and swimming depth of free-swimming albacore, in conjunction with oceanographic observations made by ship and satellite suggests that water clarity's effect on the tuna's ability to see its prey is an important mechanism underlying the aggregation of tuna in the vicinity of oceanic fronts.

Loeb, Valerie J., Paul E. Smith and H. Geoffrey Moser. 1983. Geogaphical and seasonal patterns of larval fish species structure in the California Current area, 1975. CalCOFI Rep., 24:132-151.

Analysis of 1,504 plankton tows from the 1973 CalCOFI cruise year yielded information on geographical and temporal patterns among 204 larval fish taxa. These taxa represented the spawn of fishes from a variety of habitats and water-mass affiliations. The larvae of certain commercially valuable pelagic spawning fishes (anchovy, hake, sardine, jack mackerel, and Pacific mackerel) dominated (75.5% of total larvae): these species are treated separately from the less abundant taxa (further separated into continental shelf, oceanic, and mesopelagic categories and taxa) to permit description of underlying hydrographically related distribution patterns within the California Current area.

The composition and species abundance relations of the ichthyoplankton were similar to those reported from 1955-58. Exceptions were decreased relative abundance of sardine and increased proportions of anchovy larvae in 1975 vs 1955-58.

Anchovy, hake, and jack mackerel larvae were most abundant south of Point Conception. Abundances of rockfishes and bathylagids decreased, while those of flatfishes, myctophids and gonostomatids increased, from north to south and inshore to offshore. Absolute ichthyoplankton abundance varied by a factor of 10 between January-March (maximum) and September-December (minimum). Anchovy, hake, jack mackerel, rockfishes, sciaenids, myctophids, and bathylagids had January-March abundance peaks; myctophids and gonostomatids had July abundance peaks; flatfishes were most abundant from October-December. Regional ichthyoplankton abundance fluctuations and compositions were related to hydrographic regimes.

The area off northern Baja California marked a transition between predominantly cold-water or subarctic-transition zone species with January-March abundance peaks and predominantly eastern tropical Pacific or warm-water species with summer and fall abundance peaks. This transition zone coincides with a persistent lobe of negative wind stress curl (surface-layer convergence) extending to the coast from offshore waters; this zone may separate biological regimes of California and southern Baja California.

Loeb, Valerie J., Paul E. Smith and H. Geoffrey Moser. 1983. Ichthyoplankton and zooplankton abundance patterns in the California Current area. CalCOFI Rep., 24:109-131.

The 1975 CalCOFI data were analyzed to provide a description of regional and seasonal zooplankton and ichthyoplankton abundance patterns. Zooplankton and ichthyoplankton abundances were found to be independent of each other on all scales examined. Zooplankton abundance decreased from north to south and inshore to offshore and appeared to be related to distribution of surface nutrient levels. Greatest ichthyoplankton abundance occurred off southern California and northern Baja California and was due to large spawning stocks of migratory species (anchovy, hake, and jack mackerel); the other ichthyoplankton fraction had complex abundance patterns because of its multi-species composition. Seasonal zooplankton abundance fluctuations along the coast (from Punta Eugenia northward) appeared to follow the northward seasonal progression of coastal upwelling. Maximum ichthyoplankton abundance was associated with periods of relatively stable water conditions prior to the onset of intense coastal upwelling. Persistent high-intensity zooplankton patchiness found off northern Baja California is associated with a zone of surface-layer convergence extending to the coast from offshore areas. This convergence zone may mark a separation of southern California and central-southern Baja California coastal biological regimes.

Loeb, Valerie J., Paul E. Smith and H. Geoffrey Moser. 1983. Recurrent groups of larval fish species in the California Current area. CalCOFI Rep., 24:152-164.

Recurrent group analysis was performed on larval fish species collected during the 1975 CalCOFI survey. We arranged 27 species in 11 groups based on frequencies of co-occurrence in samples; 5 other species had "high" affinities with some members of the groups. The two largest (5 and 4 species, respectively) and their 5 associated species pair groups represented two major ichthyoplankton assemblages in the CalCOFI area.

Species of each group were frequently taken together in CalCOFI samples, shared generally similar geographical and seasonal distributions, and appeared to be relatively constant parts of one

another's environments. However, based on existing vertical distribution information, most group members and associated group species appear to inhabit different depths within the upper water column. This probably indicates limited interspecific contacts (e.g., competition for food). Within-group differences in timing of peak abundances and, in one case, regions of maximum abundance, also reduce the probability of such interactions. As a result, direct interactions at the larval stage may be negligible in controlling the larval abundances and distributions of these species. More detailed vertical distribution information is needed to verify this observation.

MacCall, Alec D. and Gary D. Stauffer. 1983. Biology and fishery potential of jack mackerel (Trachurus symmetricus). CalCOFI Rep., 24:46-56.

Young jack mackerel (age 0 to about 5 years) are most abundant in the Southern California Bight, where they school in open waters and near offshore banks. They progressively emigrate from these grounds, but the whereabouts of 6- to 15-year-old fish is not well known. The large fish, 15 to 30+ years old, school offshore in open ocean waters from Baja California to the Aleutian Islands. Ages 1 and older are capable of spawning, an exceptionally early age of maturity for a long-lived species. Spawning extends from central Baja California to British Columbia, with a tendency for larval abundance to progress northward from late winter to late summer. The Southern California Bight contains few jack mackerel larvae until late in the spawning season.

Year-class strengths are highly variable, with strong year classes typically separated by several relatively weak ones. On the basis of larvae collected on CalCOFI surveys, spawner abundance has been fairly constant since 1950. Spawning biomass is estimated to be 0.64 to 1.3 million metric tons (MT) in the CalCOFI region, with perhaps an equal biomass outside that region.

The estimated spawning biomass was allocated among age categories according to assumed mortality rate schedules. Because of age-specific mortality rates, potential yield was estimated by applying the Gulland approximation to each age category separately and summing the results. Overall potential yield estimates range from 130 to 260 thousand MT. The young inshore fish have a potential yield of 100 to 200 thousand MT, whereas the old offshore fish have a potential yield of 10 to 25 thousand MT. If a significant fishery were to develop on either segment, the other segment would probably be impacted indirectly.

MacGregor, John S. 1983. Growth of the blue rockfish (Sebastes mystinus) CalCOFI Rep., 24:216-225.

Weight-length and age-length data were obtained for samples of blue rockfish (Sebastes mystinus) taken off southern California.

For weight-length, $W = aL^b$, the value of a was found to be 2.043×10^{-5}; the value of b, 3.059.

The von Bertalanffy curve was used for age length. It was determined that $L_\infty = 327.6$ mm, $k = 0.1428$, and $t_0 = 1.553$.

Moser, H. Geoffrey, David A. Ambrose, Morgan S. Busby, John L. Butler, Elaine M. Sandknop, Barbara Y. Sumida, and Elizabeth G. Stevens. 1983. Description of early stages of white seabass, Atractoscion nobilis, with notes on distribution. CalCOFI Rep., 24:182-193.

Eggs, larvae, and juveniles of Atractoscion nobilis, reared in the laboratory, are described and compared with those of Cynoscion species. Eggs of A. nobilis are among the largest reported for a sciaenid species (1.24-1.32 mm in diameter), and the larvae have a distintive morphology and pigment pattern that contrasts sharply with that of Cynoscion species. The larvae are robust, with long pectoral and pelvic fins and have a solid pigment sheath of melanophores and xanthophores that initially covers the head and trunk and expands to cover the body completely. The only other sciaenid with similar developmental stages is Sciaena umbra of the eastern Atlantic, Mediterranean, and Black Sea. Late-stage larvae of Larimus fasciatus of the western Atlantic have large, heavily pigmented paired fins, but the body pigment is not a solid cloak as in A. nobilis.

Atractoscion larvae occurred in only 104 samples of all CalCOFI collections made between 1950 and 1978. Larvae occurred from Santa Rosa Island, California, to Santa Maria Bay, Baja California, with highest concentrations in the Sebastian Viscaino Bay and San Juanico Bay regions. Most of the larvae occurred from May to August, with a peak in July.

Picquelle, Susan J. and Roger P. Hewitt. 1983. The northern anchovy spawning biomass for the 1982-83 California fishing season. CalCOFI Rep., 24:16-28.

The 1982 equivalent larval census estimate of the spawning biomass of the northern anchovy (Engraulis mordax) central subpopulation is 1,866,000 MT (2,060,000 short tons). This estimate is based on data gathered by an egg production survey conducted from January 18 to March 9, 1982. The abundance of larvae is projected from the daily production of eggs and the subsequent mortality of eggs and larvae. This equivalent larval census estimate will be the basis of the anchovy fishery optimum yield (OY) for 1982-83.

The egg production method estimate of anchovy spawning biomass is 378,000 MT (417,000 short tons). This is based on a production of 12.30×10^{12} eggs/day and a population (males and females) fecundity of 3.253×10^{7} eggs/day/MT. The standard error of the egg production method estimate is 97,200 MT, for a coefficient of variation of 25.7%.

In 1982 the central subpopulation of northern anchovy was geographically distributed in the inshore portion of the Southern California Bight, from the Santa Barbara Channel Islands to northern Baja California. A smaller group was detected between Monterey and San Francisco Bays.

Stauffer, Gary D. 1983. Calibration of northern anchovy spawning biomass estimates derived by egg production and larval census methods. CalCOFI Rep., 24:11-15.

A mathematical procedure is developed for converting estimates of northern anchovy spawning biomass derived by egg production methods to values equivalent to those derived by larval census methods. This calibration is based on the results of concurrent spawning biomass surveys conducted for both methods in 1980 and 1981. Two egg production surveys were made in 1981. The coefficient of proportionality for the two biomass estimators is not a simple constant but a function of egg survival, daily population fecundity, and larval mortality rate all of which may vary from year to year. The common link between these two biomass estimators is the daily production of larvae at the time of hatching. The coefficient of proportionality between the hatching rates derived from the two estimators is relatively constant for the three test cases. The proposed equation for converting egg production estimates of spawning biomass to equivalent larval census estimates may result in a bias of 3.1% in the equivalent larval census estimate.

Approved by Center Director

Adams, Peter B. The diet of widow rockfish (Sebastes entomelas) in northern California. For consideration for publication in the Proceedings of the Widow Rockfish Workshop.

Brill, Richard W. Kewalo Research Facility--1958 to 1983--25 years of progress. Am. Inst. Fish. Res. Biol. (Briefs).

Grigg, Richard W., Jeffrey J. Polovina, and Marlin J. Atkinson. Model of a coral reef ecosystem: Part III, Resource limitation, community regulation, fisheries yield and resource management. Coral Reefs.

King, Michael G. and Robert B. Moffitt. The sexuality of tropical deepwater shrimps (Crustacea: Pandalidae). For consideration for publication in J. Crustacean Biol.

Ueber, Edward. The widow rockfish fishery. For publication in the Proceedings of the Widow Rockfish Workshop.

Administrative Reports

Honolulu Laboratory

Everson, Alan R. 1983. Seamount fishery, foreign vessel observer report, Kitakami Maru (July 22-October 20, 1983). SWFC Admin. Rep. H-83-26.

Kaya, Calvin M. 1983. Providing larval fish as food for larvae of skipjack tuna: Investigations on induced spawning of manini, or convict surgeonfish, (Acanthurus triostegus sandvicensis). SWFC Admin. Rep. H-83-25C.

Polovina, Jeffrey J., and Mark D. Ow. 1983. ECOPATH: A user's manual and program listings. SWFC Admin. Rep. H-83-23.

Tiburon Laboratory

Fougner, Svein and Norman J. Abramson. Report of a workshop on sablefish research needs. SWFC Admin. Rep. T-83-02.

Translations

Murata, Mamoru, Masa Ishii, and Masanao Osako. 1981. Characteristics of the fishing condition for surume-ika and aka-ika (Surume-ika to aka-ika no gyokyō no tokuchō). Suisan Sekai 30(5):78-88. (Engl. transl. by Tamio Otsu, 1983, 18 p., Transl. No. 86; available Southwest Fish. Cent., Natl. Mar. Fish. Serv., NOAA, Honolulu, Hawaii 96812.)

Murata, Mamoru, Masa Ishii, and Chiomi Shingu. 1982. The fishing condition for surume-ika and aka-ika in the Pacific Ocean in 1981 (56-nen no Taiheiyō kai-iki ni okeru surume-ika to aka-ika no gyokyō no tokuchō). Suisan Sekai 31(5):60-66. (Engl. transl. by Tamio Otsu, 1983, 13 p., Transl. No. 87; available Southwest Fish. Cent., Natl. Mar. Fish. Serv., NOAA, Honolulu, Hawaii 96812.)

Tanaka, Tamotsu. [1982.] Atlas of skipjack tuna fishing grounds in southern waters, 1980-81 fishing seasons (June 1980-April 1982). Tohoku Reg. Fish. Res. Lab., Yaizu, Japan [27 p. text, 32 charts]. (Engl. transl. by Tamio Otsu, 1983, 86 p., Transl. No. 85; available Southwest Fish. Cent., Natl. Mar. Fish. Serv., NOAA, Honolulu, Hawaii 96812.)

HONOLULU LABORATORY

INSULAR RESOURCES INVESTIGATIONS

Submersible Research Plans Developed

Following the success of fishery resource assessment work from the Hawaii Undersea Research Laboratory submersible Makalii, plans have been developed for further use of submersibles by researchers in the Insular Resources Investigation for understanding the abundance, behavior, and habitat preference of bottomfishes and shrimps. A proposal was written by Dr. George W. Boehlert, Chief, Insular Resources Investigation, for submission to the NOAA Office of Undersea Research, to study fish populations on Hancock Seamounts in 1985. Although the submersible necessary for this work would have depth requirements in excess of the capabilities of the Makalii, plans are underway to consider further research in the Hawaiian Chain with the Makalii.

Growth of Seabass Estimated

James H. Uchiyama, Fishery Biologist, estimated the growth of Hawaiian seabass, Epinephelus quernus, from data on body length and annuli counts on otoliths made by research assistant Jeffrey D. Sampaga. Research assistant Darryl T. Tagami assisted with the computation of the von Bertalanffy growth parameters: $L_\infty = 114.7$ cm, $K = 0.376$, and $t_0 = 0.686$. These results indicate that the seabass caught by handline on research cruises of the Townsend Cromwell were 3 to 7 years old. The largest seabass caught during the survey period in the Northwestern Hawaiian Islands (NWHI) was 110.6 cm total length.

Data Editing System Devised

Darryl Tagami, who is Data Manager for the Insular Ecosystem Program, reports that he has drafted a data editing request form for use by program personnel when correcting known or obvious errors in data collected on cruises. Tagami notes that the form will accomplish several things:

1. Provide clear instructions to Data Management and Technical Services (DMTS) personnel on which records are to be corrected and how the corrections are to be made, thus reducing editing errors and avoiding the usual misunderstandings resulting from verbal requests;

2. Serve as a record of all the editing done on cruise data since DMTS maintains no such records or documentation; and

3. Help maintain the integrity of the data by requiring that changes requested by any program personnel be approved by the Data Manager (there will be more control on who can make changes and what type of changes can be made).

Preparations Under Way for Seamount Workshop

Research assistant Robert L. Humphreys, Jr., is making preparations for the seamount workshop in Shimizu, Japan, in March 1984. Preliminary updated sounding and bathymetry charts of the southern Emperor and northern Hawaiian Ridge areas were obtained from Jaclyn Mammerick of Scripps Institution of Oceanography who is updating bathymetry charts of the Pacific. Humphreys also contacted the NMFS Language Services Division in Washington, DC regarding five Soviet publications on pelagic armorhead.

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Richard Uchida, Leader, Insular Ecosystem Program, and Jimmy Uchiyama continued work on the draft of the fishery atlas of the NWHI. Uchida condensed several species descriptions and rewrote sections describing the various gears used in the survey.

Uchida also reviewed a draft of the "Midway Islands albacore fishery feasibility study" prepared by Pacific Analysis Corporation under contract to the Hawaii State Department of Land and Natural Resources.

Uchida and research assistant Michael P. Seki made preparations for a 3-day meeting on December 6-8 at the NMFS Beaufort Laboratory with members of the Ocean Thermal Energy Conversion (OTEC) Pre-Application Consultation Team to review, discuss, and provide input for the final report on potential impact of OTEC operations to fisheries.

FISHERY MANAGEMENT RESEARCH PROGRAM

Fishery Data Collected

Dr. Robert A. Skillman, Leader, Fishery Management Research Program, reports that Ray F. Sumida, Fishery Biologist, is continuing to process the incoming Cooperative Hawaii Vessel Inventory and Classification Survey data. Approximately 3,200 survey forms (out of some 6,000) have been returned after the second mailing was sent out.

Sumida also reports that data are being collected on the landings made by purse seiners in Pago Pago, American Samoa. In cooperation with the Office of Marine Resources of America Samoa, data such as the vessel's name, date of unloading, landings by species, transshipment destination and general area of catch are being collected, if at all possible. The data collecting operation in Samoa has been altered to put equal emphasis on both fisheries, the foreign tuna longline fishery and the western Pacific tuna purse seine fishery.

Also, tuna purse seine data for landings at Hawaiian Tuna Packers are now being received from Steve Koplin of the Regional Office. The data on landings by species and by vessels for January 1983 through the present are being processed.

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Thomas S. Hida, Fishery Biologist, assisted the operators of the charter boat, Kono, in completing voluntary logbooks.

Hida and research assistant Nathaniel T. Shippen are preparing new summaries of data records from the military charter vessel, Mele Moku, which have now been updated through July 18, 1983.

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Research assistant Victor A. Honda worked on a report of the Hawaii tuna longline fishery. He also completed revision of an annotated bibliography on marlins, wahoo, and mahimahi.

Vessel Inventory Data Management System Completed

Samuel G. Pooley, Industry Economist, reports that research assistant James C. Cooper completed the Vessel Inventory Data Base Management System for the CompuPro. The system is designed to allow easy access to the Honolulu Laboratory's data on Hawaii's fishing vessels. Its primary feature is that it allows the selection of subsets from the entire data base. The system is still in a test phase but the existing inventory information is in the process of being transferred from the IBM to the CompuPro via the Molecular.

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Research assistant Wesley K. Higuchi completed computer outputs of tables and plots for Hawaii commercial fish landings. The summaries provide monthly and annual average statistics over the 20 years since 1949 for billfish and bottomfish management species. The outputs will be included in an administrative report.

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The Honolulu Laboratory received the final report of the Guam seafood imports study: "Market for fresh or frozen whole fish on Guam," University of Guam Marine Laboratory Technical Report No. 84, by Paul Callaghan, now the Assistant Director of Commerce for the Government of Guam, and Robert F. Myers, and William J. Fitzgerald, Jr. The report is available in the library.

PELAGIC RESOURCES INVESTIGATION

Another Yellowfin Tuna Successfully Tracked

Dr. Richard W. Brill, Leader, Experimental Ecology of Tunas Program, Lt. (jg) J. Scott Ferguson, NOAA Corps, and Dr. Kim Holland, Hawaii Institute of Marine Biology successfully completed a 24-hour track of a yellowfin tuna, Thunnus albacares, tagged with an ultrasonic transmitter, aboard the RV Kaahele'ale. The 55 cm fork length fish was caught at 7:00 a.m., November 17, immediately adjacent to fish aggregating buoy S which is located off the Waianae coast of Oahu. The fish remained in the vicinity of buoy S for only a short period and then proceeded via a relatively direct course to fish aggregating buoy V, which is located approximately 10 miles north of buoy S. The fish remained in the immediate vicinity of buoy V for approximately 7 hours, until it moved rapidly offshore (west) just before sunset. The fish was followed until approximately 7:00 a.m. the following day when the tag was shed.

This track conclusively shows that yellowfin tuna will successively visit fish aggregating buoys that are up to 10 miles apart and that they apparently have the ability to learn buoy locations and directly navigate from one buoy to another. Additional attempts to track yellowfin tuna for up to 48 hours will be continued in the coming months.

Manuscripts on Physiological Studies of Tunas Completed

Dr. Brill reports that two manuscripts on physiological studies of tunas were completed and submitted for outside review. The first ("In vitro and in vivo acid-base regulation in the skipjack tuna (Katsuwonus pelamis): Effects of temperature change and exhausting exercise" by S.F. Perry, C. Daxboeck, R.W. Brill, P.W. Hochachka, and B. Emmett) is part of a larger study on lactate metabolism and acid-base regulation in tunas which is designed to elucidate the causes of the conditions known as "burnt tuna" and "honey combing." The former is more prevalent in large yellowfin tuna and the latter in skipjack tuna, but both significantly reduce the commercial value of the fish in which they occur.

The objective of this study was to determine how skipjack tuna regulate blood acid-base balance after producing high muscle lactate levels during strenuous exercise. Also, of interest was the determination of how an appropriate blood pH could be maintained in relation to rapid temperature change. Skipjack tuna (and other tuna species) are unique in that their blood is subjected to 2°-10°C temperature changes with each circuit through vascular countercurrent heat exchangers, or as these fish make rapid ascents or descents into the open ocean.

The study showed that skipjack tuna can somehow rapidly rid themselves of the excess hydrogen ions (created when lactic acid disassociates into lactate and hydrogen ions) and can, therefore, rapidly restore blood acid-base status. Also, it was clearly demonstrated that tuna have developed a unique system to maintain appropriate blood acid-base status while undergoing rapid temperature changes. "Non-tuna" fish species take up to several days to restore blood acid-base status after experiencing a rapid environmental temperature change because they adjust blood pH by regulating blood bicarbonate ion levels, which is a slow process that involves manipulation of an active ion exchange mechanism most likely located in the gills. Skipjack tuna, on the other hand, are able to take up or release (as appropriate) large quantities of hydrogen ions from hemoglobin or possibly other blood proteins. Skipjack tuna do not need to change blood bicarbonate ion concentrations actively to correct acid-base disturbances created by rapid temperature changes. Rather, blood acid-base status is adjusted rapidly by a unique chemical buffer system found in skipjack tuna blood. Further studies in this area are planned for next summer.

The second manuscript sent for outside review ("Thermal dependence of contractile properties of single skinned fibres isolated from Antarctic and various Pacific marine fishes including skipjack tuna (Katsuwonus pelamis) and kawakawa (Euthynnus affinis)" by I.A. Johnston and R.W. Brill) deals with the maximum contraction velocity, maximum isometric tension, and the effects of temperature on these attributes of single, isolated, skinned, red and white muscle fibers. One of the significant discoveries from this study was that, for the skipjack tuna, the effect of temperature on the maximum contractile velocity is much greater in red muscle fibers (Q_{10} 3) than in white muscle fibers (Q_{10} 2). However, at the same temperatures, the maximum contractile velocity of white muscle fibers was approximately six times that of red muscle fibers, which is as expected because red muscle fiber portions of the myotomes are used at sustained swimming speeds and white fiber portions of the myotomes are used for high speed swimming.

When the white muscle fiber portions of the myotome are being used, the slower red muscle fiber would not be able to add any propulsive force to the fish's caudal fin because they would be moved passively by the more rapidly contracting white fibers. However, the 5°-7°C temperature difference that exists between red and white muscle fiber portions of the myotomes in skipjack tuna during bouts of high speed swimming and the high temperature sensitivity of the contractile velocity of the red muscle fibers means that during bouts of activity, the contractile velocities of red and white muscle fibers may be

nearly identical. Both may, therefore, be providing propulsive force to the fish's caudal fin.

In skipjack tuna, 25-30% of the muscle mass is made up of red fibers, compared with 5-10% in "non-tuna" teleost fish species. Therefore, it is obviously important that both red and white muscle fibers be actively providing propulsive force to the caudal fin, when both muscle fiber types are active (e.g., during bouts of high speed swimming). Thus study provides unique new insights into the selective advantages of tuna's ability to maintain elevated muscle temperatures and into tunas' use of red and white fiber portions of the myotomes at different levels of swimming activity.

LA JOLLA LABORATORY

Coastal Fisheries Resources Division

COASTAL EASTERN PACIFIC FISHERIES ENVIRONMENTAL INVESTIGATIONS

Research Findings Concerning Albacore Using Satellite Imagery and Sonictracking

Drs. R. Michael Laurs and Paul Fiedler have recently completed a manuscript for publication dealing with the use of satellite imagery in albacore research studies involving the relationships between albacore and oceanic fronts.

The migration, distribution, availability and vulnerability of albacore to fishing are markedly influenced by oceanographic conditions in the north Pacific, notable hydrographic fronts. For example, albacore fishing grounds in the western Pacific have been linked to oceanic fronts in the region of the Kuroshio current and Kuroshio Extension waters. Seasonal migration into North American coastal waters is associated with the Transition Zone and its frontal boundaries. Coastal upwelling fronts and fronts at the margin of river plumes influence local concentrations and movements of albacore in U.S. coastal waters. U.S. albacore fishermen traditionally fish in blue, oceanic waters warmer than 15°C and near fronts indicated by temperature or water color "breaks." Fishing grounds are often found associated with undersea topographic features, such as seamounts and banks, which are believed to be sites of local enrichment and food abundance.

Optimum temperature ranges for albacore catch have been determined from commercial or research vessel catches and sea surface temperature measurements. However, documentation of an association between albacore and thermal or color fronts has not been possible owning to the difficulty of obtaining concurrent catch and hydrographic data covering sufficiently large areas.

Since 1978 earth-orbiting satellites have the ability to rapidly provide data which yield images of sea surface temperature and mark the turbidity and phytoplankton pigment concentration of near-surface waters over large areas of the ocean. Some of these data are used to provide U.S. west coast fishermen with sea surface temperature and ocean color boundary charts. Drs. Laurs and Fiedler found that environmental features observed in satellite infrared and color images of the sea surface define boundaries for albacore aggregations and optimum fishing regions (indicated by daily catch data obtained from logboat records kept by U.S. jig fishermen).

The satellite images and concurrent albacore catch data clearly show that the distribution and availability of albacore are related to oceanic fronts. They also substantiate the conventional wisdom of many fishermen who use temperature and/or color "breaks" to locate areas of potentially productive fishing for albacore. The results show that in nearshore regions off the coast of North America commercially fishable aggregations of albacore are found in warm, blue oceanic waters near temperature and color fronts on the seaward edge of coastal water masses. Relatively intense fronts are favored, such as those associated with persistent upwelling; shoreward intrusions of oceanic water are also particularly favorable sites for albacore aggregation.

The results also show that in offshore waters during late summer commercial concentrations of albacore are found associated with hydrographic boundaries which are marked by color fronts detectable from satellites, but lacking temperature gradients. The availability of albacore in offshore waters appears to be higher in relatively productive waters. The temperature signature denoting the boundaries of the relatively more productive waters, if present earlier, may be lost due to seasonal warming. The color gradient pattern, however, is conserved.

Explanations for the environmental preferences of albacore are changing as new knowledge is acquired. Past studies stressed confinement to a physiologically optimum temperature range or utilization of frontal gradients for thermoregulation. Temperature by itself, however, cannot explain distribution of albacore observed off North America. Recent evidence based on acoustic tracking experiments conducted by Laurs and Dotson in conjunction with vertical temperature measurements show that albacore move vertically through the thermocline and experience temperature changes of 5°C or more in 10-30 minute periods.

Albacore are believed to migrate to exploit the high densities of food organisms available in North American coastal waters. Albacore are opportunistic carnivores and consume northern anchovy, saury, euphausiids, squid, and decapod shrimp off California. Suboptimum temperatures perhaps limit them to the edges of the productive coastal water mass where these organisms are most abundant. However, like all tunas, the albacore is a visual predator. The aggregation of albacore in clear water on the oceanic side of fronts in nearshore areas off North America may reflect an inability to capture large, mobile prey efficiently in turbid coastal water and a dependence on food that has migrated or dispersed across the coastal-oceanic boundary. In offshore regions of the eastern north Pacific, the aggregation of albacore in relatively productive waters occurs presumably because relatively higher amounts of food organisms are present, yet the waters are clear enough for the albacore to detect them.

SWFC and American Fishermen's Research Foundation Continue Investigation to Develop Winter U.S. Albacore Longline Fishery

The U.S. albacore fishery has traditionally operated during summer and fall months, usually within a few hundred miles of the North American coast. In some years the fishery extends as far south as central Baja California, Mexico, and as far north as northern British Columbia, Canada. In recent years U.S. fishermen have also begun to fish for albacore near the dateline and eastward during early spring and summer months.

The NMFS is participating in a study with the American Fishermen's Research Foundation (AFRF) to evaluate the potential for establishing a U.S. longline fishery on North Pacific albacore during winter months in eastern North Pacific waters. Saltonstall-Kennedy (S-K) funds managed by the NMFS Southwest Regional Office in Terminal Island, California, have been awarded to the AFRF to charter fishing vessels and finance other costs. The AFRF has been awarded four S-K grants for studies of exploratory longlining fishing operations. Each of these has been conducted cooperatively with the NMFS/SWFC. The first study, conducted in January-February 1981, investigated the possibilities of expanding the U.S. albacore fishery to operate outside the traditional summer and fall seasons using longline fishing methods. The results of the first study showed that it was feasible for U.S. fishing vessels in the 50- to 80-foot size-class to longline for albacore during the winter months. A limited quantity of gear was deployed with subsequent small catches in 1981; however, the catch rates were sufficiently high to suggest that a profitable winter albacore fishery could be developed. The second study, conducted in January-February 1982, was designed to expand upon the 1981 finding. The amount of gear deployed was increased to reflect potential commercial efforts and a fishing strategy was proposed based upon associations of catch and subsurface thermal structure found in the first survey. The third study conducted in late 1982, was designed to evaluate distribution and catch rates in November-December. Historical records on Japanese longline catches show high catch rates in November and December and on the average slightly better weather might be expected. A follow-up to investigate further the potential for catching albacore by longlining during November-December is presently underway by two vessels which are receiving fuel subsidies from S-K funds awarded to AFRF.

An area several hundred miles off the coast of southern California and extending to the longitudes of about the Hawaiian Islands has been selected for the overall study. The operational aspects of the study are carried on by the AFRF and managed by the Western Fishboat Owners Association (WFOA), a west coast association of albacore fishermen. Fishery scientists under the direction of Laurs at the SWFC assisted in planning the study and worked with the AFRF and WFOA to organize it. In addition, the SWFC provided scientific equipment and two fishery scientists are aboard the two fishing vessels to make scientific observations and to keep detailed records related to the fishing operations and catch. The purposes of the field operations have been: 1) to conduct exploratory fishing using longline fishing methods to determine if sufficient catches of albacore can be made to support an expansion of the

U.S. fishery, 2) to make scientific observations to determine oceanographic conditions that may influence albacore distribution and catchability in the area, and 3) to collect scientific data for albacore biology and fishery studies. The scientific observations included: (a) vertical temperature profiles and surface ocean temperature measurements, (b) albacore tagging for migration and stock structure studies, (c) collection of detailed records on fish catch, amount of gear fished, modifications made to fishing gear and fishing tactics, and size composition of tuna caught, and (d) experiments to measure the depth distribution of longline gear during a set.

Results From Albacore Tagging Discussed at Fishermen's Meeting

Dr. R. Michael Laurs presented a talk at the 1983 general membership meeting of the Western Fishboat Owners Association held in Reno, Nevada in mid-November. Laurs' presentation dealt with the albacore tagging program that is being conducted cooperatively by the SWFC and AFRF. Approximately 20,000 albacore have been tagged and released since the start of the program in fall 1971 and nearly 1,200 tagged fish have been recovered.

Laurs discussed what has been learned from the tagging results and how the new information is being used by fishery scientists and fishermen. Highlights of his talk included a discussion of tagging results in the development of the U.S. distant water fishery in the western and central North Pacific, presentation of information on large-scale and small-scale migration patterns of albacore, an explanation of the hypothesis that at least two substocks of albacore comprise the North Pacific albacore population instead of a single stock as was believed earlier, and information on the age and growth of albacore.

The presentation was well received by the estimated 110 fishermen and spouses who attended.

1983 U.S. Albacore Fishery Landings Higher Than Last Year

Dr. Michael Laurs, Leader of the Fisheries Environment Investigations at the La Jolla Laboratory, reports that the preliminary estimated catch for the 1983 U.S. albacore fishery is between 10,500 and 11,000 tons. While this total is about 30% below the ten-year average of 15,675 tons, it is about 40% higher than the catch landed in 1982, which was about 7,650 tons. Several factors contributed to the increased catch in 1983, including oceanographic conditions, in part associated with the El Niño, relatively good weather, especially off central and northern California, and a more stable market for fish-buying by processors.

Albacore arrived in waters south of Pt. Conception about one month earlier than usual, and fair catches were made until the end of July. After July, catches dropped to virtually nil for the remainder of the season owing to very warm upper layer ocean temperatures and deep thermocline conditions associated with the El Niño. While oceanographic conditions related to the El

Niño were detrimental to albacore fishing south of Pt. Conception and in much of the Pacific Northwest, the El Niño was in part responsible for the best albacore fishing in a number of years off central and northern California. Water conditions were favorable, oceanic fronts important for the aggregation of albacore were close to shore, and weather conditions were generally good resulting in the best fishing conditions and catch rates for several seasons between Pt. Conception and Eureka. In coastal waters off much of Oregon and Washington, however except for brief periods in local areas, e.g., off the Columbia River, Newport, Coos Bay, etc., albacore catches were generally low owing in large part to the lack of upwelling fronts to concentrate fish. Some of the best albacore fishing during the 1983 season occurred about 1,000 miles off northern Oregon, where a large fleet of boats made high catches for a number of weeks during August to late September. There was relatively good fishing in coastal waters off British Columbia for brief periods in the latter part of the season, as is usually the case.

The albacore fishing this year accurately reflected the albacore forecast prepared by Dr. Laurs and his staff in early June prior to the start of the 1983 season. In addition to the seasonal forecast, albacore fish bulletins detailing fishery information were issued biweekly by the Investigation Staff.

Daily albacore fishing broadcasts were also made during the 1983 fish season, as they have been since 1967. In all 72 broadcasts were made this year over 9 radio stations, twice daily by Ron Dotson, Fishery Biologist, who prepared the broadcasts, based on information gathered from contacts with fishermen, fish buyers, fish processors and State agency personnel.

COASTAL EASTERN PACIFIC POPULATION BIOLOGY OF FISHES

First Maturity of Anchovy Linked to Birthday

Fishery biologists Dr. John Hunter and Carol Kimbrell report that they have completed an analysis of size at first-maturity for anchovy taken during the last 5 anchovy biomass surveys. A strong relationship exists between female length and sexual maturity but for the smaller females (length < 100 mm) it is highly variable from year to year. The smaller females were close to one-year old as the mean size of females at the age one year varied from 91-100 mm in those surveys, depending on the year. Much of the interannual variation in maturity is due to variation among the females that were smaller than the size of one year old fish, as nearly all females > 105 mm were mature regardless of the year.

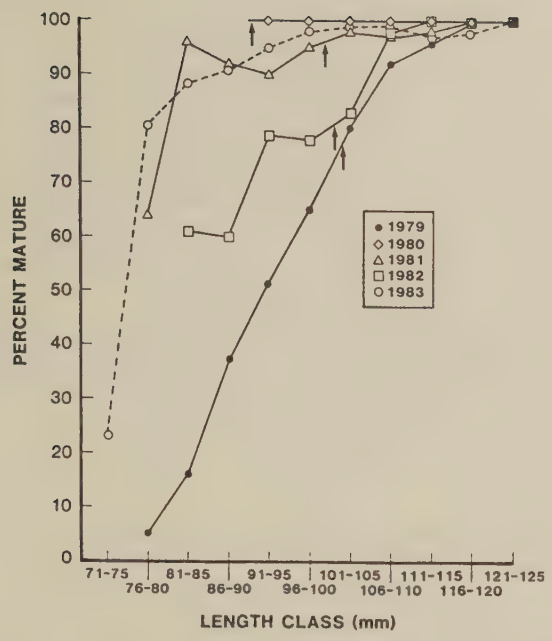


Figure 1. Percent of various standard length classes of northern anchovy that were mature during peak spawning months from 1979 to 1983. Arrows indicate the mean length of 1 year old females taken during the survey period (unpublished data K. Mais, Calif. Dept. Fish and Game).

According to Hunter and Kimbrell the interannual variation in maturity of the small females may be related to their age as a relationship appears to exist between the average birthdate of the newly recruited females and the probability that they will spawn during their first season. The birthdates of juveniles anchovy have been estimated in the fall for those years by John Butler and Richard Methot, Fishery Biologists. Their data indicate that in the years when many small females reached sexual maturity (1980, 1981, 1983) the mean birthdate of the cohort occurred earlier in the spawning season than in years when fewer small females attained sexual maturity (1979, 1982). This conclusion is documented for one size class of females in the table below but the same trend exists for all size classes less than 100 mm.

Birth year	Mean birthdate	Percent maturity of females of 91-95mm SL
1979	March 1	100
1982	March 4	95
1980	March 6	90
1978	March 27	51
1981	April 4	79

Thus a difference of only one month in the mean age of the cohort affects the proportion of small females within a given size class that attain sexual maturity in their first potential spawning season. In short, an age specific as well as a size specific effect on sexual maturity exists in anchovy. Effects of age on sexual maturity are seldom documented in such a short lived species as anchovy which may reach maturity near their first birthday. It is the fine age resolution provided by the birthdate analysis of Butler and Methot that makes this analysis possible. Although the difference in mean age of the cohort was only 30 days, it may have significant consequences for the production of eggs by the cohort. In addition to smaller females having a greater probability of spawning because of their age, females in older cohorts also may have two other advantages. They may have a greater average size, thus increasing the probability of spawning on the basis of size as well as age and also increasing the production of eggs since batch fecundity is proportional to weight.

RESEARCH FOR MANAGEMENT OF COMMERCIAL AND RECREATIONAL FISHERIES

Micronekton Sampler Tested at Sea

Nets are the most effective tools used by fishery scientists to sample fish in the sea. No one net, however, has yet been found which can capture all sizes and all species. Thus, there is a continued evolution of net design and construction. The Coastal Fisheries Resources Division at La Jolla is beginning a new program of sampling micronekton and juvenile fish for which a 12-foot Isaacs-Kidd midwater trawl (IK12) has been constructed. The net which has a 10 m^2 mouth opening and uniform mesh with 2 mm pores was first deployed in September 1983 aboard the NOAA Ship, David Starr Jordan. This report concerns its second deployment aboard the Jordan during the period November 14-18, 1983, with fishery biologist Dr. Richard Methot acting as Chief Scientist; Dimitry Abramenkoff, Biological Technician, coordinated pre-cruise modifications to the IK12 and John Butler, Fishery Biologist assisted at sea.

Three major objectives of the work were to determine the cable tension while towing the IK12, to assess the capability for doing a quantitative oblique tow, and to compare its catch rate to that of the larger midwater trawl (MWT). Cable tensions were 2,000-3,000 lbs at a speed of 2 knots, 4,000-5,000 lbs at 3 knots and 7,000-12,000 lbs at 4 knots. The trajectories of oblique tows were monitored with an acoustic depth recorder. These trajectories indicated that the scope (wire out/depth to net) increased as the net approached the surface. Typically the scope was 3.0-4.0 when the net was deeper than 30 m, then rapidly increased to about 6.0 when the net approached the surface. This effect may be due to the thrust of the ship's screws impacting on the net and must be eliminated if quantitative oblique tows are to be conducted. Relative catch rate was measured by towing the IK12 along the same tow path as that sampled by a MWT on the Oregon Beaver chartered by Ken Mais of California Department of Fish and Game. Six tows were made with the MWT and five with the IK12. Both nets captured a similar size range of

anchovy (60-120 mm) but a quantitative comparison of the two sets of samples has not yet been made. The MWT typically captured about 100 times as many specimens as the IK12. This is a greater difference than can be explained by the approximately 20 times difference in mouth area and probably indicates herding of fish by the bridle of the MWT and avoidance of the IK12.

El Niño Conditions Persist off California Coast

Several projects were successfully conducted on the IK12 testing cruise: Observations on temperature, salinity, oxygen, and chlorophyll were collected along CalCOFI Line 90 by oceanographer Ron Lynn with assistance from Dimitry Abramenkoff and SIO graduate students Amatzia Genin and Jeff Napp. New instruments utilized in this work include a rosette of Niskin water bottles on the CTD, a digitizer for the XBT, and a new fluorometer. The observations indicated that the 18°C isotherm was as deep as 50 m 120 miles offshore, indicating the continued strong presence of El Niño conditions. In a separate study, Genin used the CTD and XBTs to study the strength of the eddy over a shallow seamount, while Napp used the CTD with rosette sampler to collect a sequence of samples on an isotherm as internal waves undulated the isotherm. SIO graduate student Waldo Wakefield assisted in the IK12 work and towed an otter trawl in the San Nicolas Basin to collect specimens of thornyhead, Sebastolobus altivelis. Richard Charter and Susan Iacometti successfully tested the new Molecular Super-microcomputer at sea. Drs. William and Margaret Hamner of UCLA observed standard CalCOFI sampling procedures and collected potential predators of anchovy larvae. Claire Hoffman and Beth Norton, students at UCSB, participated as observers and assisted in all phases of the work.

Results of Similar Studies on Anchovies in California and Peru Provide Insights to their Population Dynamics

Fishery biologists Drs. Alec MacCall and Paul Smith conferred this month with visiting scientist Dr. Juergen Alheit who is in charge of the German-Peruvian cooperative project at the Instituto del Mar in Callao, Peru. Dr. Alheit has implemented egg production method (developed at the SWFC) estimates of anchoveta spawning biomass, and has investigated rates of egg cannibalism by methods similar to those employed by fishery biologists Dr. John Hunter and Carol Kimbrell of the Southwest Fisheries Center. Comparison of the results of these similar studies on anchovies in California and Peru provide insights to their population dynamics.

In both cases, the mortality of eggs due to cannibalism is 25 to 30% of the total mortality. However, the overall mortality rate is about twice as high as Peru. The egg mortality rate due to cannibalism is about 0.1/day (10%) in California, and about 0.2/day (18%) in Peru. The Peruvian resource was estimated at slightly more than one million tons spawning biomass, which is less than 1/10 (possibly 1/20) of the abundance in the 1960's. This estimate of egg mortality rate in Peru demonstrates that the usual interpretation of the Ricker stock-recruitment curve cannot be valid for the

Peruvian anchoveta: the usual interpretation of the Ricker model assumes that density dependent mortality rate is proportional to stock abundance. This would imply that egg cannibalism rates were 2.0 to 4.0/day (86 to 98%) in the 1960's, and over the two days to hatching less than 2% of the eggs would survive cannibalism alone. This intensity of density dependent mortality is very unlikely on theoretical grounds. It is much more likely that mortality rates from egg cannibalism respond to density, which itself varies much less than overall stock abundance due to expansion and contraction of the range of the stock.

Another interesting question is, "Why does the Peruvian anchoveta show twice the egg cannibalism rate of the California anchovy at similar levels of stock abundance?" The Peruvian anchoveta is much more concentrated than the California anchovy so that densities are several fold higher in Peru, suggesting that cannibalism rates should be similarly higher. However, the observed rate is only about two-fold higher in Peru, suggesting that the Peruvian anchoveta may spend a smaller fraction of time feeding than its California counterpart. Food concentrations are known to be much higher in Peru, lending support to this hypothesis.

In general, the higher the density dependent component of egg and larval mortality rates, the higher are the potential harvesting rates which have been estimated for the two fisheries, and help to explain the phenomenal productivity of the Peruvian anchoveta during the heyday of its fishery.

Management Information Document for Coastal Pelagic Resources in Preparation

The California "wetfish" fleet harvests several coastal pelagic fishes including anchovy, Pacific mackerel, jack mackerel, squid, bonito, and potentially sardine. Of these fishes, only anchovy is managed by a formal Fishery Management Plan (FMP). Pacific mackerel and bonito are managed under California regulations, and sardine remain under a state-imposed moratorium pending recovery of the resource. In view of likely future applications for "joint-venture" (JV) fishery permits on one or more of the species, the Southwest Region of NMFS has requested that the SWFC produce a "Management Information Document" (MID) which will cover the information necessary for responding to these JV permit requests (perhaps in a "Preliminary Management Plan"). The MID will also investigate issues bearing on possible development of a multi-species FMP for coastal pelagic resources. The resulting information should be of use to state, and federal agencies (particularly the Pacific Fishery Management Council) in deciding on whether to proceed with development of a formal FMP for the group of resources.

Dr. Alec MacCall, Fishery Biologist, will coordinate production of the document. A meeting of state, regional and SWFC (both Coastal and Oceanic Fisheries Resource Divisions) scientists was convened to discuss the issues to be addressed in the MID. A Nominal Group Technique (NGT) idea generating session facilitated by planning officer David Mackett, produced a useful and comprehensive list of important issues. Alec MacCall subsequently organized these ideas by use of Interpretive Structural Modeling. The resulting flow

diagram constitutes an initial "contents" of the MID, and shows how the various issues relate to each other.

Morphometric Analysis Used to Predict Condition of Young Jack Mackerel

As part of a study to evaluate factors which affect the survival of young fish, Gail Theilacker, Fishery Biologist, is determining the nutritional condition of jack mackerel, collected at sea. One of the techniques she uses to estimate the incidence of starvation relies on identifying changes in larval morphology, a technique which was developed in the laboratory. Five body measurements were taken on mackerel of known feeding history, and a multivariate analysis (stepwise discriminant analysis - SWDA) was used to relate the suite of body measurements to fish condition. A morphometric function derived with the SWDA correctly predicted the feeding history of 85% of the laboratory-raised mackerel.

The laboratory-determined morphometric function was used to classify the condition of sea-caught mackerel. Five body measurements were taken on 400 sea-caught mackerel and their size was adjusted for shrinkage. Both handling and preservation cause shrinkage of young mackerel; the amount of shrinkage differs between their body parts, and in addition, differs between laboratory and field conditions. Last month Theilacker reported on specific shrinkage factors. Application of these adjustments for differences in shrinkage of standard length, head length, eye diameter, and body depth should equate the morphology of the net-collected and preserved mackerel with the morphology of laboratory-raised mackerel of the same nutritional condition.

The morphometric analysis predicted that between 62 and 74% of the first-feeding mackerel collected 350 km offshore were dying per day due to starvation. The mortality rates decreased to zero for mackerel at two weeks of age.

Histological criteria that reliably diagnose the viability of laboratory-raised mackerel were also used to detemine the condition of these mackerel. The histological index indicated that between 57 and 70% of the first-feeding mackerel were dying per day due to starvation.

This agreement between the two indices suggest that the morphological technique, when applied correctly, can be an efficient alternative to the more expensive and time-consuming histological method.

Satellite Studies of Fish Environment Continue

A Sea Grant meeting on remote sensing was held at the Scripps Institution of Oceanography on November 30, which Drs. Michael Laurs, Reuben Lasker, and graduate student Jan Svejkovsky attended. Laurs presented a paper, "Recent studies using the coastal zone color scanner imagery in fisheries research". Svejkovsky spoke on "The effects of climate and weather on albacore migration and distribution in the Northeastern Pacific Ocean". In the latter,

Svejkovsky pointed out how some ocean chlorophyll and thermal fronts as seen from satellites are virtually stable for weeks or sometimes a month or longer. Svejkovsky hypothesizes that it is these stable, mature fronts which attract albacore because forage has enough time to accumulate there. This work will be the subject of Svejkovsky's Ph.D. thesis. It is sponsored by the University of California's Sea Grant under a grant to Dr. Lasker.

Oceanic Fisheries Resources Division

TUNA AND BILLFISH RESOURCES PROGRAM

Tagging Record for Striped Marlin off Southern California

Fishery biologist James Squire reports that the effects of ocean warming off southern California (2-4°F above normal) from August through October has changed the catch distribution pattern for striped marlin. Very warm temperatures (76-80°F) off San Diego and Los Angeles have resulted in a northwest shift of the center of catch from the usual fishing areas off San Diego and near Catalina Island. Excellent catches were reported in a new area which extends from near Osborne Bank (off Santa Barbara Island) to south of Santa Rosa and Santa Cruz Islands. Ninety percent of the record 225 striped marlin tagged and released this fishing season were caught in the new area. This record number was about 4 times the fish usually tagged off southern California.

Japanese-Mexican joint-venture longliners fishing for striped marlin and swordfish about the lower tip of Baja California have been alerted to watch for these tags. As seasonal cooling occurs, a number of recoveries are expected as the fish retreat southward into Mexican waters.

SWFC Scientists Participate in 14th Regular Meeting of ICCAT/SCRS

From October 31 through November 9, 1983, the Standing Committee on Research and Statistics of the International Commission for the Conservation of Atlantic Tunas (ICCAT) held its 14th regular meeting in Madrid, Spain, to determine the status of tuna and billfish stocks covered under the ICCAT Convention. The U.S. scientific delegation to this meeting was headed by Dr. Gary Sakagawa, Chief of the Oceanic Fisheries Resources Division and consisted of NMFS scientists from the SWFC and SEFC (Southeast Fisheries Center). Drs. Norman Bartoo and Pierre Kleiber were the other SWFC scientists in the delegation.

SWFC scientists participated in all sessions of the SCRS and chaired a number of important discussion groups: Dr. Bartoo served as rapporteur for the skipjack status of stock report and convener of the Working Group on SCRS Organization. Dr. Kleiber served as rapporteur for the multispecies

Interaction-tropical tunas report. Dr. Sakagawa served as rapporteur for the multispecies Interaction-temperate tunas report, convener of the Skipjack Subcommittee and substitute convener of the Statistics Subcommittee. Eight working documents prepared by the tuna research team at the La Jolla Laboratory were presented by the SWFC scientists to the SCRS.

The findings on the status of tuna stocks of the SCRS can be summarized as follows:

Yellowfin tuna.--For the eastern stock, the stock appears to be fully exploited. Catch is high, consisting of large numbers of small fish and at the level of MSY, 107,000-114,000 mt with current exploitation patterns. Fishing effort, however, appears to be in excess of that required to yield MSY; consequently, the SCRS warned that if these trends continue, stringent regulations will be necessary to maintain maximum productivity.

Skipjack tuna.--Data primarily collected during ICCAT's International Skipjack Year Program served as the basis for the assessment. The stocks appear to be underexploited and can withstand additional fishing pressure which will produce additional yield.

Bigeye tuna.--The Atlantic stocks are currently being fished at or close to their MSY levels (32,900-74,100 mt for the north stock and 23,700-49,200 mt for the south stocks) with existing exploitation patterns. The SCRS, therefore, concluded that increased fishing effort is unlikely to generate increases in sustainable yield.

Albacore.--For the north stock, exploitation is at a moderate level with the catch and effort currently below the levels for MSY. The SCRS noted that increases in fishing effort would probably result in increases in sustainable yield. The south stock, on the other hand, appears to be exploited at or beyond the MSY level. The Committee warned that if the surface fishery for albacore in the south Atlantic develops into a major fishery, the sustainable yield is likely to decrease owing to the smaller sizes of fish that are caught by the surface fishery.

Bluefin tuna.--The SCRS was unable to reach a consensus on the current state of the Atlantic bluefin tuna stocks. It noted that ongoing analyses that are scheduled for completion in 1984 will serve as the basis for a thorough status of stocks determination in 1984.

Other highlights of the meeting included presentation of the final report of ICCAT's International Skipjack Year Program by Dr. Sakagawa, who was involved in supervising the Program since its inception in 1979 and the appointment of Dr. Bartoo as convener of the Subcommittee on Statistics for the next two years.

Investigation Started on Genetic Variation Within and Between Eastern Pacific Squid

An electrophoretic investigation of genetic variation both within and between species of eastern Pacific squid is being initiated by Dr. John Graves, Fishery Biologist, and Lisa Ankenbrandt, Biological Aid. Results of the proposed study will improve understanding of taxonomic relationships and intraspecific genetic structure as well as link oceanic larvae with their adult counterparts. At present not all larval oceanic cephalopods can be identified to the species level. To date several species from various locations have been collected. Preliminary analyses will be conducted to determine available electrophoretic loci, tissue of maximum locus activity and optimal electrophoretic loci, tissue of maximum locus activity and optimal electrophoretic conditions. After these studies are completed, levels of interspecific differentiation, and for those species with sufficiently large sample sizes, levels of intraspecific variation, will be examined.

Status of Atlantic Tuna Fishery Sampling Program

Foreign-caught Atlantic tunas transshipped to Puerto Rico are sampled routinely for biological information by biological technician Eugene Holzapfel. Data on fork length, weight, and species composition of catches are collected. Of the 98 samples taken in 1983 to date, 84 are from the eastern Atlantic (off the coast of Africa) and 14 are from the western Atlantic. Results of Holzapfel's sampling from January 1, 1983 to November 30, 1983 are as follows:

Species and gear	# of samples	# of fish sampled	Tonnage sampled (MT)
Yellowfin			
Purse seine	16	1068	523.0
Baitboat	23	1768	304.3
Longline	1	71	1.1
Unknown	12	894	175.0
Skipjack			
Purse seine	8	406	2055.2
Baitboat	11	553	1340.5
Unknown	2	101	117.0
Bigeye			
Purse seine	12	402	278.4
Baitboat	2	69	1.0
Unknown	6	162	47.9

Albacore			
Longline	2	100	1262.6
Blackfin			
Baitboat	2	100	13.3
Bullet tuna			
Purse seine	1	50	180.3

From January 1 to November 30, 1983, 23 size composition samples were collected for the SWFC by the Inter-American Tropical Tuna Commission. These samples were collected from the catch of six foreign purse seiners who fished in the Caribbean Sea and transshipped their catches to Puerto Rico. A summary of these data follows:

Species	Trips sampled	# of samples	# of fish sampled
Yellowfin	6	9	450
Skipjack	6	8	402
Blackfin	3	3	109
Bigeye	2	2	6
Albacore	1	1	18

Progress Continues on North Pacific Albacore Model

In preparation for an albacore modeling workshop to be held at the SWFC's La Jolla Laboratory in December, albacore catch and effort data have been assembled for ten subareas of the North Pacific and for three fisheries: the jig fishery, the baitboat fishery, and the longline fishery. The subareas are those that have been defined for the North Pacific albacore model. To obtain aggregate effort for the subareas from effort in individual 1° and 5° squares, a weighting technique was used. This technique ensures that if there is a proportionality between catch, effort, and population density within the 1° or 5° squares making up each subarea of the model, then that proportionality is maintained for the aggregate catch, aggregate effort and average population density in each model subarea, even if the population density is not uniform within the subareas.

How Much Squid do Tunas Eat?--Food Habits Reviewed

A review of food habits studies of eastern tropical Pacific (ETP) tunas has been completed by biological aid Lisa Ankenbrandt emphasizing information

on cephalopod forage and their importance to the predator. Ankenbrandt reports that cephalopods do not appear to be a predominant prey for tunas in the eastern tropical Pacific. Volumetric percentages of prey from all studies consisted of 65.4% fishes, 18.1% crustaceans, and 16.5% cephalopods. The predominant cephalopod families captured by tunas included Ommastrephidae (Ommastrephes bartramii, Dosidicus gigas, and Symplectoteuthis oualaniensis), Loliginidae, Argonautidae, Octopodidae, Onychoteuthidae, and Enoploteuthidae. Ankenbrandt examined variations in the diet, comparing cephalopod importance to that of fishes and crustaceans in terms of volume, numbers and frequency of occurrence. The percentage of squids to ocotopods was also compared.

The multiplicity of prey indicates that tunas are nonselective feeders and that stomach contents are probably determined by prey availability in any given area. Tunas and other higher trophic level predators could serve as more efficient samplers of fast swimming epipelagic fauna than conventional sampling gear. Comprehensive food investigations of these predators provide an alternative method of assessing cephalopod populations in the eastern tropical Pacific Ocean.

Cooperative U.S.-Mexico Study of the California Sea Lion at the Coronado Islands Started

A cooperative U.S.-Mexico study of the California sea lion, Zalophus californianus, at the Coronado Islands, Mexico, was initiated in November. The project is a 3 year study in cooperation with the Escuela de Ciencias Marinas, Universidad Autonoma de Baja California in Ensenada, Mexico, and the Coastal Marine Mammal Project at the SWFC. Horacio de Anda, a student from the University, will be working with Mark Lowry, Fishery Biologist, to study the food habits of the sea lions inhabiting the Coronado Islands and to monitor occurrence of tagged animals that move from rookeries off the California coast.

The joint project will provide information to evaluate the impact of sea lions on commercial fisheries and the movement of sea lions along the California coast into Mexican waters.

The first trip to the islands was made on November 17, 1983. The objectives were to collect Zalophus scats for food habits analysis and survey the four islands for pinnipeds. The largest sea lion haulouts were found on the western side of north and south Coronado Islands. The total number of pinnipeds counted from the vessel were: 249 Zalophus, 108 Phoca vitulina, and 20-30 Mirounga. Rough seas off the western side of the islands prevented more precise counts from being made.

MARINE MAMMAL ASSESSMENT

Bioenergetics Model of Co-schooling Tuna and Dolphins Planned

Dr. Elizabeth Vetter joined the SWFC last month to begin work as a National Research Council Post-Doctoral Associate. She is working in the Oceanic Division, developing a comparative bioenergetics model of co-schooled tunas and dolphins. Dr. Vetter who recently earned her Ph.D. from the University of Georgia is interested in systems ecology.

Theoretical Studies of the Gross Annual Reproductive Rates of Marine Mammals Completed

A final contract report on the theoretical aspects of Gross Annual Reproductive Rates (GARR) was received by Dr. Steve Reilly, Operations Research Analyst, and Dr. Daniel Goodman of Montana State University. The report contains important findings for investigations of reproductive rates from biological data on porpoises from the eastern tropical Pacific (ETP). In past determinations of the status of ETP porpoise stocks, GARR has been used to measure relative reproductive status. Goodman's study has revealed an inherent statistical bias in using GARR from exploited and unexploited stocks of the same species to infer net reproduction. The nature of the bias is such that application of the method results in an overestimate of net reproduction rate.

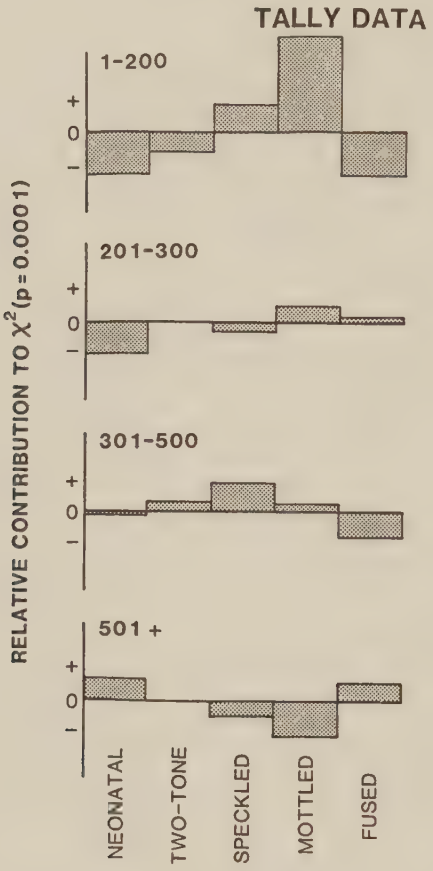
Panel Held to Review Vital Rates Studies

During November 3-4, a panel of experts met at La Jolla to review investigations completed on porpoise reproductive rates. This was one of a series of panel meetings, bringing in outside experts to review research results, preliminary to a comprehensive status of ETP porpoise stocks determination in 1984. Papers reviewed at the meeting concerned variability, trends and biases in spotted dolphin reproductive rates (by Jay Barlow), Reproduction in the female spotted dolphin, Stenella attenuata, from the ETP (by Albert Myrick, Aleta Hohn, Jay Barlow, and Priscilla Sloan), and, Reproductive maturity and seasonality in male spotted dolphins, Stenella attenuata, in the ETP (by Aleta Hohn, Jay Barlow, and Susan J. Chivers). The meeting was chaired by Dr. Steve Reilly. Panel members included: Dr. Douglas Chapman, University of Washington and member of the U.S. Marine Mammal Commission, Dr. John Bengston, University of Minnesota, Dr. Frank Hester, Porpoise Rescue Foundation, and Dr. James Mead, Smithsonian Institution.

Biennial Conference Held on Biology of Marine Mammals

The Fifth Biennial Conference on the Biology of Marine Mammals held in Boston, November 27 to December 2, was attended by Jay Barlow, Steve Reilly,

Elizabeth Vetter, Charles Oliver, William Perrin, and Aleta Hohn of the La Jolla Laboratory. Hohn and Reilly presented papers at this meeting.



This figure shows the relative contribution to x^2 (either positive or negative) for school size and color phase groupings of spotted dolphins from the tally data. Based on this distribution neonatal and fused (= adult) animals are under-represented in small schools, while speckeled (juvenile and pre-adult) mottled animals are way over-represented. This general trend holds for schools up to 500, then the reverse is true.

Hohn presented a paper, co-authored with Michael D. Scott, IATTC, titled "Segregation by age in schools of spotted dolphin in the eastern tropical Pacific". It is recognized that many social mammals segregate into distinct age groups; subadult age classes often leave the main breeding herds, returning only when they are physically and socially capable of reproducing. Evidence for this was found in schools of Tursiops off Florida and in Stenella spp. off Japan. Now Hohn and Scott have found segregation occurring in Stenella attenuata in the eastern Pacific. Four data sources were examined and all confirmed that segregation occurs in this population. First, the age distribution of a random sample of animals killed incidental to tuna purse-seine operations (n=1829) shows a dearth of specimens in the subadult age classes. Second, a sample of sightings of small schools (less than 100 animals per school, n=227 schools), those less likely to be captured, shows that 22.5% of those schools were comprised solely of juveniles and subadults.

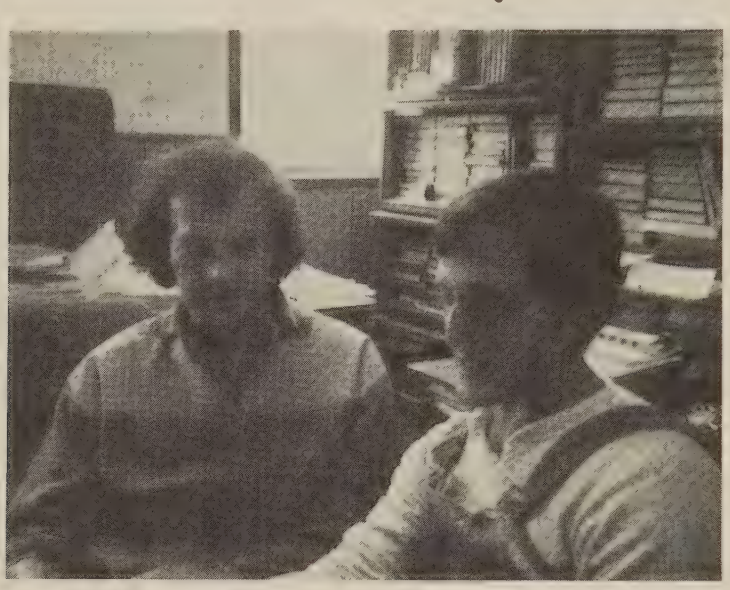
In addition, the smaller the school size, the less likely the school will contain neonates. Third, the tally of animals killed from 1973-1982 (n=48,000) shows similar results with juvenile and preadult animals occurring in schools of less than 200 animals much more often then expected and neonates and adults occurring in schools of more than 500 animals more often than expected. Fourth, aerial photogrammetric data from mixed-species schools in which spotted dolphins were the minority species shows the spotted dolphins to be mainly the size of subadults, or specimens missing from the age distribution of animals killed in tuna purse-seine operations.

Reilly presented a paper titled, "Projected future trends in gray whale population size". In this study, population trends for the California-Chuckotka stock of gray whales were projected from 1980 through 2050, under a variety of annual removal quotas for the Soviet subsistence fishery. Age-structured models were used to simulate population growth and hunting mortality. Catches of 0 to 210 animals per year or more resulted in a continual decrease through 2050. A detailed examination of the population model used for the simulations suggested that the maximum net productivity level is with a population of about 11,300. A simulation with 320 removals per year, and run for an additional 100 years to 2150, stabilized the population near 11,200 animals, after about the year 2095. These results are sensitive to inferred values for vital rates, initial population level in 1980, carrying capacity, and assumptions about density dependence of population levels.

PACIFIC ENVIRONMENTAL GROUP

French Scientist Completed 10-Month Stay at Pacific Environmental Group

Claude Roy of ORSTROM (Office de la Recherche Scientifique et Technique Autre-Mer), the French overseas scientific research group, completed a 10-month cooperative stay at PEG this month. During this time, Roy worked primarily with Dr. Roy Mendelssohn on an analysis of oceanographic influences on tuna catches in the Gulf of Guinea for the years 1969-1979.



Claude Roy of ORSTROM at left and Dr. Roy Mendelssohn of PEG.

Using newly developed statistical techniques to analyze the dynamic space-time behavior of several variables when there is missing data, Roy and Mendelssohn examined both the local and the broadscale relations between yellowfin and skipjack CPUE, sea surface temperature (SST), and the two components of the wind vector. The local models were used to "fill-in" the missing data; a qualitative analysis of these results show the estimated data to be reasonable. In many areas, the model predicted significant CPUE during a period of the year when there had been little or no fishing effort. In 1980 to the present, the fleet has started to fish in these areas during these periods, and the observed level of CPUE is consistent with the model estimates. Also, when data was artificially removed from a series, the model estimates closely reproduced the known data.

The local models show that the optimal level of CPUE is found when there is an alternating sequence of SST, that is, cool surface ocean conditions a month before the fishing occurs are followed two weeks later by warm surface

temperatures (or vise-versa in some areas), with wind being important in the upwelling and frontal regions. This picture is consistent with hypotheses developed by other PEG scientists concerning oceanographic conditions necessary for areas of high biological production.

Roy and Mendelssohn also show that at frequencies of one cycle and two cycles per year, SST propagates at a regular speed across the equator, and travels poleward in both directions at about the same speed. The variation of yellowfin CPUE at these frequencies is shown to follow the same pattern and to exhibit a similar rate of propagation. Skipjack CPUE also follows SST but not as closely as in the case of yellowfin.

The picture presented by this analysis is consistent with current theories of remote forcing in the equatorial Atlantic. To further test this, the analysis of SST was extended to a broader area. The results of this re-analysis are consistent with an explanation that there is a Kelvin wave that propagates eastward across equatorial Atlantic, and that there are Rossby waves that propagate westward in response. While the analysis does not prove the remote forcing theory, it is one of the first pieces of empirical evidence for validity of the theory. Moreover, it raises the intriguing possibility that the dynamics of tuna in the Gulf of Guinea are closely associated with this remote forcing.

As a result of Roy's stay, several papers either have been submitted for publication or are in the process of being submitted. The collaboration has resulted in development of methodologies which are potentially applicable to other important fishery stocks and environmental situations. For example, applications to North Pacific albacore are presently being evaluated and appear to offer promising research avenues.

TIBURON LABORATORY

FISH COMMUNITIES INVESTIGATION

Recommendation of Groundfish Management Team Incorporated into Council Guidelines

The Pacific Fishery Management Council met in Boise, Idaho early this month and recommended a set of groundfish regulations based on estimates of the Allowable Biological Catch (ABC) produced by the Groundfish Management Team. Dr. William Lenarz, Leader of the Groundfish Analysis Task at the Tiburon Laboratory, and a member of the Team, was a major contributor to these estimates.

As a result of the meeting, the Department of Commerce is considering the following:

1) The coastwide Optimum Yield (OY), 9300 mt, for widow rockfish was set at ABC. The 1984 OY is 1200 mt less than the 1983 OY. The Council recommended that during the first trimester vessels be limited to one trip exceeding 3000 pounds per week. A trip will not be allowed to exceed 50,000 lbs.

2) The Ground Management Team estimated that the ABC of rockfish, other than widow rockfish and Pacific Ocean perch (Sebastes complex), is 9200 mt in the Vancouver-Columbia area. This is 300 mt less than 1983. The Council set a harvest guideline for the other rockfish at 110% of ABC. The Council recommended that during the first trimester the vessels be limited to one trip per week exceeding 3000 lbs and that a trip not be allowed to exceed 30,000 lbs.

   No other significant changes in regulations were recommended. The fishery will be reviewed at the end of the first trimester and regulations changed if necessary.

UNDERUTILIZED FISHERY RESOURCES

Study of Minced Fish Products Gets Underway

Yamasa Enterprises, a Los Angeles firm which manufactures surimi and Japanese fishcake products, recently began a project to study the flesh characteristics of jack mackerel, Pacific mackerel, and shortbelly rockfish. The project, funded by a Saltonstall-Kennedy fishery development grant and administered by the West Coast Fisheries Development Foundation, has as its goal increased utilization of the three species in minced fish products.

Personnel at the Tiburon Laboratory are aiding in the Yamasa project by collecting or arranging the collection of fish samples. In November they obtained fresh Pacific mackerel from Monterey Fish Company, and shortbelly rockfish from Producer's Seafood in Oakland. Jack mackerel was unavailable, which was unfortunate, since the project was spurred by the San Pedro Fishermen's Cooperative Association, which is interested in seeing additional markets for Pacific and Jack mackerel.

Task leader Sus Kato and fishery biologist Sennen Salapare transported the Pacific mackerel to Yamasa Enterprises in Los Angeles, where the physical attributes of the fish were noted and the flesh was made into surimi. Shortbelly rockfish was headed and gutted at the Tiburon Laboratory and air-freighted to Los Angeles. Preliminary analyses of the flesh, done by Dr. Minoru Okada, a noted Japanese fishery biochemist who was hired for the study, indicated that surimi made from both species was unsuitable for traditional Japanese fishcake projects. The flesh of Pacific mackerel had no cohesiveness or elasticity, both of which are essential for making fishcake, where shortbelly rockfish apparently has an enzyme that causes hydrolysis of the flesh at a critical temperature. Further tests will be made at different times of the year to learn if seasonal differences occur, and flesh of the three species will be tried in other types of minced products.

Cruise Preparations Nearly Complete

Personnel of the Tiburon Laboratory Fisheries Development Task spent most of the month preparing traps and other gear for the forthcoming cruise aboard the NOAA Ship, David Starr Jordan. Fishery biologist Bill Leet reports that seven different styles of traps have been constructed or refurbished for the December 12-20 cruise. The traps will be used in experimental fishing for tanner crab and spot prawn. In addition, vertical longlining trials will be conducted for ocean whitefish and blackgill rockfish. Three students from the University of California at Santa Barbara have been invited to go along to observe and help with the fishing operations.

FISHERIES INFORMATION SYSTEMS AND AUTOMATIC DATA PROCESSING

CALFIN and PACFIN Update

This month John Davies, Computer Programmer, on detail at the Southwest Region, Eric Knaggs, California Department of Fish and Game and Gary Gailbreath of the Southwest Region met to discuss the transfer of data from the California Department of Fish and Game enforcement computer system directly to the Southwest Region/Southwest Fisheries Center's enforcement computer system. A decision was made to continue the use of magnetic tapes until the auto-dial system is implemented on the Fish and Game's computer system.

Davis has reformatted four Market News Report programs so that the reports are in publishable form and do not have to be retyped before being sent to the publisher. The editing of the fishing gear codes in the 1978 California landing data and the correction of the translation of species codes from the State to NMFS have been completed. Still remaining is to create a translation file for gear codes. Once this is done, according to Davis, the tapes will be created for NMFS, Washington, DC and used for the annual report of the Service.

Monthly PACFIN landings data for groundfish were successfully dialed to the California Department of Fish and Game PDP 11/70 computer; the groundfish data were then automatically transferred to the Fishery Management Information System which is a coast-wide system used to monitor the groundfish fishery on the west coast.

Computer systems programmer Susan Iacometti has released the vessel file documentation for the PACFIN Fishery Research Information System (FRIS), a system that contains detailed 1974, 1975, 1976, and 1981 vessel and landings data for California, Oregon, and Washington. Iacometti continues data integrity testing of the yearly FRIS summary files.

Significant Accomplishments Made in WPACFIN

David C. Hamm, Computer Systems Analyst, reports that two fairly major Western Pacific Fishery Information Network (WPACFIN) milestones were accomplished during November. The first accomplishment concerned a meeting among Center Director Dr. Izadore Barrett, Laboratory Director Richard Shomura, and Henry Sakuda, Director, Hawaii Division of Aquatic Resources (HDAR). Discussions centered around the recently completed Hawaii System Study and its recommendations for upgrades to HDAR's data processing procedures and capabilities. It was agreed that HDAR will actively pursue an agreement of confidentiality and exchange of data among SWFC, NMFS, and HDAR. Since action is probably required by the Hawaii Legislature, the earliest that the agreement can go into effect is June 1984.

The other noteworthy accomplishment for November was the completion of programming for the first major module of the Guam creel survey data expansion system. The completed module consists of four programs that process sample creel survey data from the existing data base management system files to produce monthly island-wide estimates (with confidence limits) of catch, effort, and catch per unit of effort (CPUE) by gear for the offshore fisheries in Guam. Hamm will be demonstrating the software to personnel at the Guam Division of Aquatic and Wildlife Resources (DWAR) and the Commonwealth of the Northern Mariana Islands, Division of Fish and Wildlife (DFW), on a trip scheduled for November 25 to December 11, 1983. Hamm will also be working with these fishery agencies on problem areas in the development of subsequent modules of the expansion system and obtaining their input for development of functional and technical specifications for these modules.

In addition, Dr. Skillman reports that a data share and confidentiality agreement has been completed with the Government of Guam. Similar agreements are now being developed with American Samoa and Northern Mariana Islands.

Molecular Super-microcomputer 32X Delivered and Installed at Tiburon Laboratory

The Molecular Super-microcomputer 32X was delivered and installed at the Tiburon Laboratory this month. The initial installation included 2 terminals, 3 matrix printers, and the cipher tape unit. Electronic engineer Jack Brown installed the CDC matrix printer which had previously been unused. The Diablo letter quality printer could not be installed and was shipped to Brown in La Jolla for diagnostic tests to locate the problem. The software word-processing system, WordStar, was installed in the Tiburon system through a patch supplied by computer programmer analyst Bob Nydam.

Services of PMC Expert Requested to Interface Computer with Electronic Data Acquisition System

In a recent letter to Admiral Charles Townsend, Director, Pacific Marine Center (PMC), Seattle, Center Director Izadore Barrett has formally requested the assistance of Michael Webb, Electronics Engineer, to interface the shipboard Molecular Super-microcomputer 15-8 with the CAMAC, the electronic data acquisition system. The software which interfaces the CAMAC with existing shipboard collection instruments was developed by the PMC.

The Super-microcomputer 15-8 is presently at the La Jolla Laboratory for the scheduled work by Webb. Further testing of the system is also planned by Susan Iacometti and Rich Charter who have successfully used the Molecular Super-microcomputer 15-8 as a remote multi-user unit by dialing into the system from off-site terminals.

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In other ADP activities, Dorothy Roll, Computer Systems Analyst, Bob Nydam, Computer Programmer Analyst, and Rob Bistodeau, Student Assistant, met with executive officer Ben Remington and Richard Winn, Accounting Technician, this month for discussions of the implementation plan for the Financial Reporting System (FRS) on the Molecular Super-microcomputer 32X. The target date for on-line entry and reporting into the FRS is March 1984. During February, Nydam will visit other Center Laboratories to assist their accounting personnel with use of the system.

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On November 18, Cindy Meyers, Computer Programmer in the Coastal Division, Robert Nydam and Dorothy Roll of the Center's ADP staff attended the southern California and Arizona Federal ADP Council meeting at the Naval Amphibious Base, Coronado. Topics discussed were laser technology in ADP, impact of personal computers on the organization, after the processing revolution - beyond the year 2000, and artificial intelligence.

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Rich Charter continues to develop the inter-active larval/egg data entry program to be implemented on the La Jolla Standard MP/M Multi-User Micro for the CalCOFI system project. Data editors Ron Whyte and Doug Hammond are updating the Net Two Data Base with information on plankton volumes for the year 1951 through 1959. An estimated 76% of the data have been entered.

Molecular Super-Microcomputer 15-8 Tested

Susan Iacometti, Computer Systems Programmer, and Richard Charter, Computer Specialist, tested the Molecular Super-microcomputer 15-8 under sea conditions during the 5-day anchovy recruitment survey cruise aboard the NOAA Ship Jordan in November. The computer performed without difficulties, even in weather when scientific work on the deck was cancelled. However, the unit was not subjected to extreme conditions which would be encountered if the ship were heading into high seas. Under those conditions, Iacometti and Charter believe it would be advisable to shut off the computer.

As a result of their assessment of the performance of the Molecular Super-microcomputer during sea trials, Iacometti and Charter are recommending that a power saver, magnetic tape drive, and a spare disk drive be procured to improve the reliability of the unit.

MISCELLANEOUS

HONORS AND AWARDS

Tiburon Laboratory

Tina Echeverria was elected to a two-year term as Director of the Central California District of the American Institute of Fishery Research Biologists.

Brian Jarvis has received an Outstanding Performance Award.

Edward Ueber has been elected president of WAVE (Western Association for the Valuation of Ecosystems) for 1984, the second time he has been chosen for the post.

SEMINARS

La Jolla Laboratory

November 8 - Dr. Jeffrey J. Polovina, Honolulu Laboratory, Southwest Fishries Center, discussed "Fishery resource assessment in the Mariana Archipelago".

22 - Dr. John Pringle, Halifax Fisheries Research Laboratory, Fisheries and Oceans, Canada, spoke on "Fisheries resource management on Canada's east coast - The Irish moss (Rhodophyta) fishery as an example".

PUBLIC AFFAIRS

La Jolla Laboratory

November 5 - Dr. Al Myrick counseled students who are preparing to enter projects in the Greater San Diego Science and Engineering Fair at Samuel Gompers Secondary School in San Diego.

21 - Dr. Al Myrick, Wildlife Biologist and Leader of the Age Determination Project at the La Jolla Laboratory, presented a talk on "Tuna and the dolphins", to a class at Madison High School in San Diego.

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Lillian Vlymen, Chairman of the Fall 1983 Combined Federal Campaign (CFC) at the La Jolla Laboratory, reported that 46 employees contributed $5,833.00 in checks and pledges, almost 25% higher than the quota established by CFC officials.

Tiburon Laboratory

Employees at the Tiburon Laboratory achieved 140% of the Combined Federal Campaign goal--$1,868. Paget Leh of the Southwest Region was campaign chairperson this year.

VISITORS

Honolulu Laboratory

November 10 - Dr. Paul J. Hooker, FAO, Indo-Pacific Tuna Development and Management Programme, Colombo, Sri Lanka, discussed tuna statistics with Richard Shomura and Dr. Jerry A. Wetherall.

14 - Harry Sperling, United Nations Development Programme, Suva, Fiji, and Ann Sperling.

- Renaud Pianet, Noumea, New Caledonia, visited Richard Shomura and Richard Uchida.

15 - Bob Douglas, John Knox, and Charles Leavitt, of TRW, Redondo Beach, California, met with Richard Shomura, Dr. Boehlert, Richard Uchida, Michael Seki, and Walter M. Matsumoto to discuss OTEC research activities.

17 - Mike Noyes, Honolulu, visited Richard Uchida.

25 - Dr. Joachim Scharfe, former FAO Fishery Industry Officer (Gear), and Dr. Richard Brock, Hawaii Institute of Marine Biology and University of Hawaii Sea Grant Program, met with Richard Shomura and Walter M. Matsumoto. Dr. Scharfe was in Honolulu to gather background information and technical data on fish aggregating devices for inclusion in an FAO technical manual.

La Jolla Laboratory

November 8 - Messrs. Joe Trujillo and Paul Kauffman, Inspector General's Office, here for discussions with John Carr on administrative matters.

28 - Dr. Dennis Hedgecock, UC Davis, visited Richard Methot to discuss a Sea Grant project on electrophoretic variation in anchovy.

PEG Laboratory

November 7-8 - Dr. Joel Picaut, University of Bretagne, France.

14 - Fred Kellenberger, SWFC La Jolla.

Tiburon Laboratory

November 22 - Betty Taylor, WASC Safety Officer, visited to become familiar with the Laboratory facilities and operations.

30 - Dr. John Gissberg, newly-appointed Fishery Attache in Japan, to familiarize himself with fishery development activities.

- Greg Andrew, Marin Conservation Corps, met with Norman Abramson to describe the Corps' capabilities relative to aquatic habitat improvement.

MEETINGS AND TRAVEL

Honolulu Laboratory

November 1 - Dr. Izadore Barrett spoke at a general staff meeting.

- Richard S. Shomura and Dr. Barrett met with Henry Sakuda for a follow-up discussion on the Hawaii data system study.

1-10 - Dr. George W. Boehlert traveled to California to visit the SWFC and to attend the Third International Artificial Reef Symposium at Newport Beach, and to Newport, Oregon, to attend the salmonid oceanography meeting and to discuss groundfish research with colleagues.

2-4 - Richard Shomura traveled to La Jolla, California, to meet with Dr. John Gulland of FAO and Dr. Barrett to discuss Indo-Pacific Fisheries Commission and Standing Committee Resource on Research and Development matters.

2-9 - Dr. Jeffrey J. Polovina traveled to California to attend the Third International Artificial Reef Symposium at Newport Beach, California, and to visit the SWFC.

14 - Richard Shomura attended a meeting on squid research at the Department of Land and Natural Resources.

La Jolla Laboratory

October 29-November 16 - Dr. Gary Sakagawa traveled to Madrid, Spain, to participate in meetings of ICCAT's Scientific Committee on Research Statistics Meeting.

November 6-18 - Dr. Izadore Barrett traveled to Washington, DC, to sit in as Acting Deputy Assistant Administrator for Science and Technology.

7-8 - Dr. Richard Methot traveled to Davis, California, to discuss the Ocean Salmon Research Project with UC Davis faculty.

8 - Planning officer David Mackett attended a meeting with Regional Office personnel at the State Street office regarding a tuna/porpoise rulemaking system.

13-17 - Dr. Tim Smith traveled to Seattle, Washington, to participate in a meeting of fur seal research program.

14-18 - Daniel Huppert traveled to the University of Rhode Island and to the Northeast Fisheries Center.

- Richard Methot was at sea on the David Starr Jordan.

November 14-December 20 - Ron Dotson was at sea aboard the F/V Natalie Rose as an observer on an experimental longline cruise and carry out associated scientific studies during the cruise.

November 14-December 15 - Dr. Angeles Alvariño was in La Paz, Mexico, to present a series of seminars on zooplankton, ocean dynamics and fisheries, and develop research projects for graduate and post-graduate biologists at CICIMAR.

November 15- - Bill Flerx was at sea aboard the F/V Resolute to

November 15-December 21 - Bill Flerx was at sea aboard the F/V Resolute to participate in longline fishing operations on an S-K funded project to evaluate the feasibility of establishing a U.S. longline fishery on albacore tuna during winter months.

November 19-December 2 - Dr. Steve Reilly traveled to Boston, Massachusetts, to attend Fifth Biennial Conference on the Biology of Marine Mammals.

November 23-28 - Dr. Dan Huppert traveled to Portland, Oregon, to meet with PMC Subcommittee regarding plan for economics research on salmon.

November 25-December 15 - Dr. Paul Smith traveled to Casablanca, Morocco, to participate in cooperative research on coastal pelagic schooling fishes in Morocco and to Lowestoft, United Kingdom, for a presentation of anchovy biomass assessment using the egg production method developed at the SWFC.

November 27-December 3 - William Perrin, Doug DeMaster, Aleta Hohn, Chuck Oliver, Larry Hansen, Al Jackson, and Jay Barlow traveled to Boston, Massachusetts, to attend the Fifth Biennial Conference on the Biology of Marine Mammals.

November 28 - Dr. Izadore Barrett attended a Tuna/Porpoise EIS Working Group meeting at the SWR State Street office.

30 - A meeting was held at the SWFC to discuss preparation of a state-federal Management Information Document on coastal pelagic species. Representatives of California Fish and Game, the Southwest Region, and both divisions of the SWFC attended.

PEG Laboratory

November 7-10 - Dr. Douglas McLain attended a workshop on salmon recruitment studies held in Newport, Oregon. He presented an invited paper on El Niño effects in the California Current.

Tiburon Laboratory

October 29-November 4 - Maureen Woods attended the Federal Interagency Field Librarians' Workshop in Denver.

October 30-November 4 - Nancy Wiley and Fred Plotkin attended the Super Micro training class in La Jolla.

November 1-4 - Susumu Kato and Sennen Salapare traveled to Los Angeles to work on a project on alternative uses for jack and Pacific mackerel and shortbelly rockfish.

7-10 - Norman Abramson and Dr. William Lenarz attended the meeting of the Pacific Fishery Management Council in Boise, Idaho.

PERSONNEL

Honolulu Laboratory

November 5 - Mark D. Ow, Computer Technician - Extension of Part-Time Temporary Appointment.

7 - Nathaniel T. Shippen, Biological Technician (Fisheries) Full-Time Temporary Appointment.

11 - Alan R. Everson, Biological Technician (Fisheries) - Termination--Expiration of Appointment.

13 - John R. Henderson, Fishery Biologist - Promotion.

La Jolla Labortory

November 13 - Cindy Meyer, Computer Programmer - Promotion.

21 - Sharon Lee Hamer, Biological Aid - Entered on Duty.

27 - Ron Dotson, Fishery Biologist - Promotion.

Tiburon Laboratory

November 25 - Barbara Burrell, Clerk-Typist - Retirement.

29 - Cheyenne Uilani Summers, Clerk-Typist - Entered on Duty.

UNITED STATES
DEPARTMENT OF COMMERCE

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